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The higher-order structure of primal world beliefs in German-speaking countries: Adaptation and initial validation of the German Primals Inventory (PI-66-G)[☆]

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ABSTRACT

Primal world beliefs—or primals—are a category of beliefs about the overall character of the world that inform individual differences in cognition, affect, and behavior. In a recent comprehensive effort, Clifton et al. (2019) cataloged 26 pervasive primals and developed the Primals Inventory (PI-99) to measure them. In this study ($N = 592$), we describe the adaptation and initial validation of the German Primals Inventory (PI-66-G), an instrument to measure primals in German-speaking countries. The PI-66-G's first-order structure was supported by exploratory factor analyses and the resulting scales demonstrated good reliability (median $\alpha = 0.81$). Based on the PI-66-G, we extend Clifton et al.' (2019) work by modeling the primals' hierarchical structure: Higher-order factor analyses reproduced their three-level model including one primary primal (Good), the three original secondary primals (Safe, Enticing, Alive), and three additional secondary primals (Empowering, Communal, Fluid). In line with the previous findings, the PI-66-G's primals were differentially (but mainly positively) correlated with the Big Five and life satisfaction. The results suggest that primals can generally be organized in a hierarchical model, but that the current model cannot properly describe every primal. Based on our findings, we discuss three hypotheses that should be evaluated in future research.

1. Introduction

The question “What is the nature of the world?” transcends issues relating to the mechanics of physics and pertains to metaphysical and aesthetic beliefs about the character of the universe in which humans find themselves. These beliefs fall under the category of *Weltanschauungen*—or *worldviews* in English—which refer to the plurality of beliefs that shape individual differences in cognition, affect, and behavior (Koltko-Rivera, 2004). From the 1950s on, beliefs about the overall world nature were adopted by psychological science and selectively investigated, such as “beliefs in a just world” (Lerner, 1980) and “dangerous and competitive worldviews” (Perry, Sibley, & Duckitt, 2013). A number of authors (e.g., Beck, 1996; Dweck, 2008) argued that the study of beliefs is key to understanding human development, flourishing, and pathology. However, there was little effort into compiling a unifying framework or catalog for systematically investigating

these beliefs' structure and their distinct psychological effects.

Clifton et al. (2019) aimed at proposing such a comprehensive empirically-derived classification of what they called *primal world beliefs*—or *primals*. They conceptualized primals as bipolar dimensions and defined six criteria for primals' identification, derived from the pertinent literature. On this basis, they identified primals by searching the literature and by analyzing historical texts (sacred texts, novels, films, speeches, treatises), twitter data, and corpus data. Iteratively, candidate primals were proposed, discussed, and confirmed or rejected in expert retreats and focus groups until there were no additional candidate primals and no more rejections. This led to an initial list of 38 primals. Next, infrequently mentioned and conceptually similar beliefs and those that arguably did not meet the six criteria were excluded, leading to a list of 25 primals for initial measurement. In their tentative model, they proposed a comprehensive category of such beliefs, including a general *Good* factor, some intermediate factors (~ 5) and 25 lower-level

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factors that correspond to their candidate primals.

Clifton et al. (2019) composed a preliminary questionnaire and explored the 234 items' factor structure in an initial study. They found 26 primals at three levels of granularity: One primary primal (Good), three secondary primals (Safe, Enticing, and Alive), and 22 of their 25 tertiary primals. Notably, they identified these three levels based on independently conducted factor analyses and did not strictly evaluate the model's hierarchical structure. They retained the items that produced simple structure and reliable scales ($\alpha = 0.82\text{--}0.87$) and arrived at their questionnaire's final version: The Primals Inventory (PI-99). In five follow-up studies, they replicated the primals factor structure, showed that the primals are distinctly connected with several individual-differences variables (e.g., the Big Five, life satisfaction, Dark Triad, trait affectivity), and that they are stable across 2-weeks, 9 months, and 19 months ($r_{tt} = 0.80\text{--}0.87$). The primal world beliefs were also connected with Lerner's (1980) beliefs in a just world and Perry et al.' (2013) dangerous and competitive worldviews, but they comprised several beliefs that were not entailed by previous models (e.g., Enticing and its associated tertiary primals).

Clifton et al.' (2019) account spawned new interest into the research on worldviews. Their primals can be assumed to influence many psychological traits and mechanisms, including personality, psychosocial development, flourishing, political leaning, and cultural differences. Indeed, Clifton and Kim (2020) outline how primals can be assumed to affect health processes and outcomes, such as by influencing the cardiotoxic stress axis and health behaviors. In order to validate such assumptions, international adaptations and validations of the model and the PI-99 are required, including a German inventory. This inventory will allow for reevaluating the primals higher-order structure in a different culture and to specifically investigate the model's hierarchical structure. The analyses will show whether the three secondary primals and their primary primal will also emerge in a German-speaking sample, whether additional higher-order primals can be found and how the primals are hierarchically connected.

1.1. Aims of this study

This paper describes the first adaptation and initial validation of the German Primals Inventory and the exploration of the primals' hierarchical structure. Clifton et al.' (2019) effort resulted in the formation of 22 tertiary primals, most of which collapsed into three secondary primals and one primary primal. Accordingly, our main objective was to compose an inventory that can distinguish these 22 tertiary primals in German-speaking countries. Our second objective was to then explore the tertiary primals' higher-order structure and to compare our results to the PI-99. For the first time, we evaluated primals' hierarchical factor structure. Our third objective was to further validate the German Primals Inventory by replicating primals' relationships with key demographics, the Big Five, and life satisfaction.

2. Method

2.1. Participants and procedure

We collected data from $N = 592$ participants (63.85% female, 34.97% male; $M_{\text{age}} = 38.01$ years, $SD_{\text{age}} = 13.24$ years, range = 18–86 years). Most were Germans (54.22%), Swiss (34.63%), and Austrians (6.59%). More than half had been enrolled in tertiary/higher education programs (59.29%) and the remainder had received upper (26.35%) or lower secondary education (12.50%) or did not report education level (2.21%). About three quarters were employed (73.99%) and about half of the remainder comprised students (14.02%).

Participants provided informed consent prior to participation and had to be at least 18 years old and fluent in German. All participants provided data on primals, and $n = 114$ and $n = 404$ participants

provided data on the Big Five and life satisfaction respectively. Further information on the sampling is in supplementary material D1.

2.2. Measures

The *Primals Inventory* (PI-99; Clifton et al., 2019) comprises 99 items to assess 26 primals at three levels of granularity: Ninety-six items distinguish 22 tertiary primals (4–5 items per scale). Sixty-nine of these and two additional items yield the three secondary primals Safe (29 items), Enticing (28 items), and Alive (14 items). Finally, another subset of 71 items, including one additional item, constitute the primary primal Good. Three sample items at each level of granularity are “The world needs me and my efforts” (Needs me), “No matter where we are, incredible beauty is always around us” (Enticing), and “On the whole, the world is an uncomfortable and unpleasant place” (Good; reverse-coded). The inventory uses a six-point scale (0 = strongly disagree to 5 = strongly agree). We adapted the PI-99 following the recommendations and standardized guidelines for translating self-report measures and tests put forward by Beaton, Bombardier, Guillemin, and Ferraz (2000; for details and the adapted items, see supplementary materials D2 and S1).

The *Inventory of Minimal Redundant Scales* (MRS-45; Ostendorf, 1990) comprises 45 bipolar adjectives to assess the Big Five traits extraversion (e.g., “impulsive” vs. “restraint”), emotional stability (e.g., “robust” vs. “vulnerable”), conscientiousness (e.g., “diligent” vs. “lazy”), agreeableness (e.g., “affirmative” vs. “oppositional”), and culture (e.g., “inventive” vs. “conventional”). The inventory uses six-point semantic differentials (1 = very, 2 = quite, 3 = rather, 4 = rather, 5 = quite, 6 = very) and yielded good internal consistency ($\alpha \geq 0.75$).

The *Satisfaction with Life Scale* (Diener, Emmons, Larsen, & Griffin, 1985; German adaptation by the authors) comprises five items to assess life satisfaction (e.g., “The conditions of my life are excellent”). The scale uses a seven-point scale (1 = strongly disagree to 7 = strongly agree) and yielded good internal consistency ($\alpha = 0.84$).

2.3. Data analysis

We conducted the analyses within the R statistical computing environment (R Core team, 2019) using the psych package (Revelle, 2019) to conduct the factor and correlation analyses. We screened the data for plausibility, missing values, and outliers (for details, see supplementary material D3). First, we inspected the PI-99-G's unique inter-item correlations¹ and conducted exploratory factor analysis (EFA) to identify those items that allow for a clear-cut estimation of the 22 tertiary primals. For this purpose, we omitted the three additional items that are associated with the secondary and primary primals only. We also omitted items that were weakly related with their designated scales and items that yielded stronger relationships with other scales. Following Clifton et al.' (2019) specifications, we used minimum residual analysis and PROMAX rotation (oblique) with EQUAMAX prerotation ($k = 3$). The resulting items constituted the final version of the German Primals Inventory.

Second, we conducted further EFAs and used the Schmid-Leiman solution (Schmid & Leiman, 1957) to evaluate the tertiary primals' higher-order structure. This solution allows for independently estimating each second- or higher-order factor's unique influence on the tertiary primals. We evaluated the parallel analysis, scree test, minimum average partial criterion, factor interpretability, and the convergence with Clifton et al.' (2019) results to decide upon the number of factors to retain in the final solution. Based on our findings, we derived the German Primals Inventory's scoring key to combine the items into secondary and primary primals. Third, we investigated the

¹ Unique inter-item correlations refer to the bivariate correlations between each two items controlled for their correlations with every other item.

primals' correlations with demographics, the Big Five, and life satisfaction.

3. Results

3.1. Objective 1: composing the German primals inventory

The PI-99-G's unique inter-item correlations and the EFA's pattern matrix are in Supplementary Tables S2 and S3. Inspecting the unique inter-item correlations yielded three important findings: As expected, most tertiary primals' items put forward strong inter-item correlations within their designated scales (e.g., Interconnected: $r \geq 0.74$ and Progressing: $r \geq 0.73$). However, some tertiary primals' items yielded comparatively weak inter-item correlations (e.g., Beautiful 2 and Stable 4). Moreover, some items sustained practically equal or higher correlations with other tertiary primals' items than with their designated scales' items (e.g., Interesting 4 and Pleasurable 5).

The EFA's pattern matrix reflected these findings: Several factors were distinctly loaded by the items of one tertiary primal (e.g., Factor 3: Hierarchical and Factor 7: Understandable). However, some tertiary primals' items only marginally loaded on the same factor as the other designated items or loaded more strongly on other factors (e.g., Beautiful 2 and Interesting 4). Specifically, some factors comprised items of multiple tertiary primals and hence could not distinguish between them (e.g., Factor 1 comprised items of Harmless, Pleasurable, Regenerative, and Beautiful, and Factor 2 comprised items of Needs me, Intentional, Just, and Meaningful).

3.1.1. The PI-66-G

Based on these findings, we decided to prioritize factor congruence over item congruence and to identify the items that yielded the strongest inter-item correlations within their designated scales and put forward the weakest inter-item correlations with the other scales' items. We also decided to only choose three items per tertiary primal to balance the number of items across scales. We again investigated these items' unique inter-item correlations and conducted a new EFA. The resulting 66 items constitute the final version: The PI-66-G. Its items, the unique inter-item correlations, and the pattern matrix are in Supplementary Tables S4–S6.

The pattern matrix shows that the PI-66-G's items loaded on 22 clear-cut factors that correspond to the respective tertiary primals: Nineteen factors were loaded only by items of one tertiary primal. Two factors (Abundant and Needs me) were loaded by additional items (Beautiful 3, Beautiful 4, and Just 5), but these items' loadings on their designated factors exceeded their secondary loadings. Finally, one factor was loaded by items of both Intentional and Needs me (Factor 1), but the items of Needs me also loaded on a distinct factor that was not loaded by any other items. Based on the pattern matrix, we computed the 22 tertiary primals' scales. Their descriptive statistics and their correlations with the PI-99-G's scales (corrected for item overlap) are depicted in Table 1.

Most means were close to the theoretically expected value (2.50) and yielded only slightly left-skewed distributions. The scales were reliable (Cronbach's $\alpha \geq 0.68$) and were highly correlated with the PI-99-G's scales ($Mdn = 0.80$). Notably, the scales only comprised three items, and hence these statistics can be considered satisfactory. This implies that the PI-66-G is comparable to the PI-99-G regarding domain coverage and can hence be assumed to reliably capture Clifton et al.' (2019) 22 tertiary primals.

3.2. Objective 2: Exploring the tertiary primals' higher-order structure

3.2.1. Second-order factor analysis

Based on the PI-66-G's tertiary primals' scales, parallel analysis suggested retaining six factors, the scree test suggested two or four factors, and the minimum average partial criterion suggested four

factors. The pattern matrices of the two-factor and the four-factor solution are in Supplementary Tables S7 and S8.

The first solution that distinguished Safe, Enticing, and Alive comprised six factors (see Fig. 1; the pattern matrix is in Supplementary Table S9). We decided to retain these six factors at the secondary level because they were supported by the parallel analysis, yielded the most comprehensive (but parsimonious) image of the tertiary primals' factor space, and entailed Clifton et al.' (2019) secondary primals. According to their loadings, we labeled the factors Safe, Alive, Enticing, Fluid, Empowering, and Communal, respectively.

The PI-66-G's secondary primals were similar to Clifton et al.' (2019) findings but differed regarding three main qualities: First, we found three additional secondary primals (Empowering, Communal, and Fluid). These primals were mainly loaded by tertiary primals that were previously found unconnected with their secondary primals Safe, Enticing, and Alive (i.e., Changing, Acceptable, and Hierarchical). However, they were also loaded by a few tertiary primals that Clifton et al. (2019) found connected with Safe (Cooperative, Stable) and Enticing (Improvable).

Second, Safe, Enticing, and Alive were partially loaded by tertiary primals that were previously found connected with other secondary primals: Funny loaded on Safe (instead of Enticing), Just loaded on Alive (instead of Safe), and Pleasurable loaded on Enticing and Fluid (instead of Safe). Additionally, Clifton et al.' (2019) unconnected tertiary primal Understandable loaded on Safe and Interconnected loaded on Communal, Alive, and Fluid. Third, some tertiary primals yielded loadings on multiple factors: Beautiful (Safe, Enticing), Cooperative (Communal, Fluid), Interconnected (Communal, Alive, and Fluid) Meaningful (Enticing, Alive), Pleasurable (Enticing, Fluid), Progressing (Safe, Communal), and Worth exploring (Fluid, Enticing). The loadings' magnitude was often comparable (e.g., Interconnected loaded with 0.38 on Alive, -0.47 on Fluid, and 0.30 on Communal) and hence suggests that tertiary primals can be produced by several higher-order factors.

3.2.2. General factor analysis

Based on the six emerging factors, parallel analysis suggested retaining three factors and the scree test as well as the minimum average partial criterion suggested one factor. The three-factor solution did not converge well, and a Heywood case was detected, suggesting poor model fit. We hence extracted one general factor and computed the Schmid-Leiman solution to estimate the general factor's unique influence on the tertiary primals (see Fig. 1; for details see Supplementary Table S9). Consistent with Clifton et al. (2019), we labeled the general factor Good. It entails every tertiary primal that was previously found connected with their general factor, and additionally includes Interactive, Interconnected, and Intentional.

3.2.3. The PI-66-G's key for the secondary and primary primals

We used the results of the higher-order analysis to combine the PI-66-G's items into secondary and primary primals (for the item key, see Supplementary Table S4). In accordance with our findings, some tertiary primals' items can be combined into multiple secondary primals (with some items keyed reversely). The secondary and primary primals' Cronbach's α , their inter-scale correlations and their correlations with the PI-99-G's secondary and primary primals are in Supplementary Table S10. The higher-order scales were highly reliable ($\alpha \geq 0.78$). The PI-66-G's scales correlated highly with the PI-99-G's scales ($r \geq 0.83$). Safe, Enticing, and Alive yielded stronger inter-scale correlations than correlations with the three additional secondary primals (Communal yielded the strongest correlations with $r \geq 0.39$). Overall, the PI-66-G can be assumed to reliably capture Clifton et al.' (2019) primary primal, their three secondary primals, and three additional secondary primals in German-speaking countries.

Table 1
Descriptives of the PI-66-G's tertiary primals and correlations with the PI-99-G.

Tertiary primal	<i>M</i>	<i>SD</i>	<i>Sk</i>	<i>K</i>	α	CITC ₁	CITC ₂	CITC ₃	PI-99-G
Abundant	3.90	0.67	−0.93	1.95	0.68	0.55	0.64	0.60	0.71
Acceptable	1.50	0.91	0.78	0.86	0.83	0.77	0.74	0.77	0.81
Beautiful	3.50	0.84	−0.45	−0.15	0.74	0.67	0.61	0.69	0.69
Changing	3.50	0.82	−0.42	0.09	0.82	0.72	0.77	0.73	0.81
Cooperative	3.00	1.12	−0.31	−0.44	0.84	0.74	0.78	0.78	0.79
Funny	3.20	0.90	−0.39	0.08	0.74	0.60	0.78	0.63	0.73
Harmless	2.60	1.03	−0.28	−0.58	0.83	0.83	0.86	0.60	0.82
Hierarchical	1.60	1.01	0.51	−0.30	0.78	0.68	0.71	0.70	0.80
Improvable	3.10	0.89	−0.54	0.65	0.80	0.69	0.75	0.71	0.75
Intentional	2.50	1.27	−0.24	−0.73	0.84	0.81	0.79	0.71	0.82
Interactive	2.00	1.13	0.28	−0.47	0.86	0.75	0.80	0.82	0.82
Interconnected	3.20	1.23	−0.49	−0.39	0.90	0.87	0.89	0.79	0.89
Interesting	3.80	0.88	−0.79	0.53	0.83	0.75	0.71	0.80	0.79
Just	2.70	1.01	−0.28	−0.25	0.68	0.56	0.65	0.58	0.65
Meaningful	3.50	0.91	−0.77	0.79	0.71	0.57	0.63	0.69	0.74
Needs me	2.40	1.23	−0.06	−0.82	0.86	0.79	0.86	0.73	0.86
Pleasurable	3.40	0.99	−0.68	0.09	0.83	0.80	0.76	0.71	0.80
Progressing	2.60	1.04	−0.07	−0.63	0.83	0.77	0.81	0.70	0.85
Regenerative	3.00	0.84	−0.34	0.02	0.75	0.72	0.71	0.57	0.77
Stable	2.10	0.91	0.11	−0.44	0.76	0.64	0.78	0.63	0.74
Understandable	2.50	1.01	−0.03	−0.33	0.80	0.78	0.77	0.62	0.82
Worth exploring	3.90	0.77	−0.91	1.22	0.81	0.70	0.76	0.74	0.80
Mdn	3.00	0.95	−0.33	−0.20	0.81	0.73	0.76	0.70	0.80

Note: *N* = 592. CITC_{1–3} = corrected item-test correlations of the three respective items; PI-99-G = correlations with the corresponding PI-99-G's tertiary primals (corrected for item overlap).

3.3. Objective 3: Evaluating the primals' relationships with key demographics, the Big Five, and life satisfaction

The PI-66-G's correlations with key demographics, the Big Five, and life satisfaction are depicted in Fig. 2. As expected, the correlations between secondary primals and their associated tertiary primals were largely comparable across all validation measures. Therefore, we focus on the results for the primary and secondary primals. Age yielded the smallest correlations: In contrast to Clifton et al.' (2019) results,² it was unrelated to the primary and secondary primals (except for Empowering). Similar to the previous findings, female participants more often endorsed the secondary primal Alive, but additionally Good, Enticing, and Communal, and less often Fluid. Having received tertiary/higher education correlated positively with Good and Enticing, and additionally with Communal, negatively with Fluid, and was uncorrelated with Alive.

Consistent with the previous findings, the Big Five traits showed large associations with Good, Safe, Enticing, and Alive. Conscientiousness and culture constituted two exceptions: They were unrelated to Good and Alive and to Enticing and Alive, respectively. Additionally, extraversion, agreeableness, and culture were related to Communal and emotional stability was related to Empowering. Finally, life satisfaction was positively correlated with Good, Safe, Enticing, Alive, Empowering, and Communal, and negatively correlated with Fluid.

4. Discussion

This paper describes the adaptation and initial validation of the German Primals Inventory (PI-66-G), which demonstrated good psychometric properties and can be recommended to measure primals in German-speaking countries. A ready-to-use version of the PI-66-G's items and scoring key and a paper-pencil version are in supplementary materials Q1 and Q2.

Many of the initial PI-99-G's items collapsed into the tertiary primals

described by Clifton et al. (2019). However, some items yielded weak relationships with their designated scales and produced confounded factors. Based on the standardized adaptation process, we believe that we adequately translated all items and that these issues pertain to systemic differences in the connection of certain items' contents with their tertiary primals. Although these differences point at cultural diversity in the processing of items that are targeted at primals, we stress that they do not speak against the validity of Clifton et al.' (2019) catalog: Our adaptation study could only show whether we can or cannot measure their 22 tertiary primals in German-speaking countries, which we have demonstrated by composing the PI-66-G. Whether or not their catalog is complete is a question that would require other research designs and is outside the scope of this study. We hence decided to omit the divergent items and additionally chose to only retain three items per tertiary primal to rule out artifactual effects of the number of items on the higher-order structure. The PI-66-G's scales yielded strong convergent relationships with the PI-99-G's scales. This shows that shortening the inventory did not truncate the construct validity and that the PI-66-G can reliably assess Clifton et al.' (2019) 22 tertiary primals in German-speaking countries. Thus, upcoming studies should use the PI-66-G rather than the PI-99-G to measure primals in German-speaking countries.

We conducted higher-order factor analyses to extract six secondary primals and one primary primal. Three of the second-order factors corresponded to Clifton et al.' (2019) secondary primals Safe, Enticing, and Alive, and were labeled accordingly. The three additional second-order factors mainly comprised tertiary primals that were previously found unconnected with Safe, Enticing, and Alive (i.e., Acceptable, Hierarchical, and Changing), but also a few tertiary primals that they found connected with Safe and Enticing. Based on the loading patterns, we labeled the additional secondary primals Empowering, Communal, and Fluid. These newly identified primals are described in more detail in the next section. Similar to Clifton et al. (2019), the general factor was labeled Good and was loaded by all tertiary primals except for Acceptable, Hierarchical, and Changing. Although we found some differences, the loading patterns of Safe, Enticing, Alive, and Good were largely comparable to the previous findings. Finally, the primals' relationships with the Big Five and life satisfaction were replicated, and the relationships with age, gender and education were largely replicated.

² We compared our results to Clifton et al.' (2019) supplementary tables SM-4.1-2 and SM-4.1-3. Regarding education, we assumed that having received tertiary/higher education is comparable to "Ed.: Finished Masters".

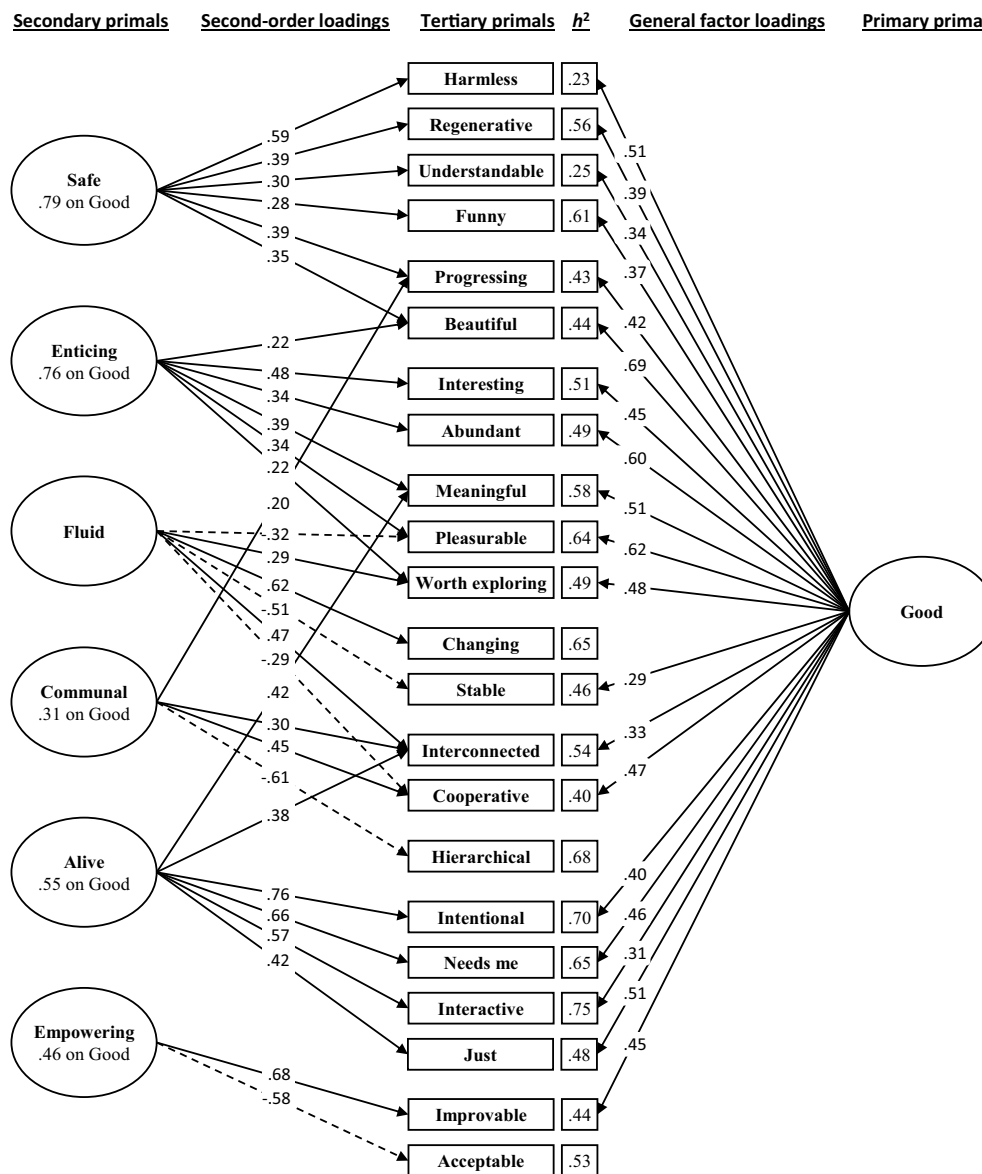


Fig. 1. Higher-order structure of the PI-66-G's tertiary primals (exploratory factor analysis using the Schmid-Leiman solution).

4.1. Continuing the brief tour of implicit worlds

Upon deriving Safe, Enticing, and Alive, Clifton et al. (2019) provided brief descriptions of these perspectives that were based on the constituting items and tertiary primals. What follows are similar attempts for Empowering, Communal, and Fluid.

Those low on *Empowering* see a troubled world that should nevertheless be accepted as is because all efforts to improve it inevitably fail. Because action is fruitless, inaction is not laziness, but wisdom. Those high on *Empowering* see a highly moldable world that invites attempts to make it even better (similar to Bandura's efficacy expectations; see Bandura, 1977). Their own attempts to improve the world can seem measured to themselves, but heroic to those scoring less high on *Empowering* and naïve—even egotistical—to those scoring low.

Those low on *Communal* perceive an unavoidably hierarchical world where life thrives via a brutal contest in which the best usually end up on top. But the resulting natural hierarchy is threatened by decline, warranting protection and caution when considering further attempts to alter it. Those high on *Communal* see cooperation, interconnection, and equality as the universe's governing principals. In this view, hierarchy is imposed, unnatural, and unfair. Yet things are improving,

which warrants optimism about what further change might bring.

Those low on *Fluid* see underlying solidity in the world around them, as if things and situations are stones retaining their shape and separateness even when intermixed. Those high on *Fluid* see all things as fundamentally evanescent, transitory, and up in the air (or, as the ancient Greek philosopher Heraclitus suggested, “fuel in a continuous fire”). This delicate and ephemeral world is constantly in flux, simultaneously unpleasant yet wondrous.

4.2. Implications of the higher-order analysis

Based on our results, we assume that Clifton et al.' (2019) three-level model comprising Safe, Enticing, and Alive as secondary primals and Good as primary primal exhaustively describes most tertiary primals' higher-order structure. Although we found some differences between the American English and the German-speaking samples, our results suggest that there could be a kernel to every higher-order primal that is universal across culture and language. Candidates for these kernels are the tertiary primals that were found connected with Safe, Enticing, Alive, and Good in both samples: Safe can be assumed to be primarily reflected by Harmless, Progressing, and Regenerative;

	Age	Gen	Edu	EX	ES	CO	AG	CU	LS	
Good	.03	.10	.10	.45	.39	.16	.31	.21	.41	1
Safe	.03	-.08	.10	.44	.41	.20	.26	.24	.39	
Enticing	.04	.11	.09	.47	.37	.21	.38	.17	.40	.8
Alive	.06	.22	.01	.29	.19	.11	.26	.11	.20	
Empowering	-.10	.00	-.03	.18	.23	.13	-.05	.14	.11	
Communal	.01	.20	.13	.22	.18	-.04	.27	.27	.26	.6
Fluid	.05	.09	-.11	-.04	-.14	.06	.06	.07	-.27	
Abundant	.13	.02	.05	.27	.21	.12	.24	.18	.27	
Acceptable	.08	.01	.05	-.10	-.12	-.13	.07	-.07	.00	.4
Beautiful	.00	.05	.04	.48	.27	.13	.29	.11	.29	
Changing	.11	.12	-.05	-.01	-.08	-.04	.10	.05	-.11	
Cooperative	-.05	.10	.13	.16	.17	-.13	.14	.11	.27	.2
Funny	-.11	.00	.02	.31	.29	.06	.15	.25	.17	
Harmless	.03	-.20	.11	.23	.27	.19	.05	-.03	.31	
Hierarchical	.05	-.22	-.07	.04	.11	.10	-.07	-.17	.02	0
Improvable	-.09	.02	-.01	.20	.26	.10	-.03	.16	.18	
Intentional	.03	.22	-.02	.22	.08	.05	.22	.04	.13	
Interactive	.00	.10	-.03	.04	.08	-.02	-.09	.10	.05	-.2
Interconnected	.07	.24	.00	.14	.06	.03	.28	.10	.11	
Interesting	.02	.15	.09	.24	.22	.17	.30	.08	.28	
Just	.00	.06	.05	.32	.24	.18	.21	.01	.24	-.4
Meaningful	.10	.20	.00	.40	.24	.22	.35	.04	.24	
Needs me	.07	.13	.05	.28	.20	.10	.23	.17	.18	
Pleasurable	.04	.01	.11	.29	.37	.12	.25	.08	.46	
Progressing	.06	-.08	.14	.26	.31	.10	.15	.26	.29	
Regenerative	-.03	.04	.09	.42	.29	.15	.32	.22	.33	-.8
Stable	-.06	.00	.14	.15	.19	-.03	.01	-.02	.26	
Understandable	.15	-.09	.02	.14	.26	.16	.11	.16	.22	
Worth exploring	-.12	.02	.09	.40	.33	.18	.22	.30	.13	-1

Fig. 2. Correlations of the PI-66-G's primals with demographics, the Big Five, and life satisfaction.

Note: $n_{\text{Age}} = 591$; $n_{\text{Female}} = 585$; $n_{\text{Tertiary}} = 592$; $n_{\text{EX/ES/CO/AG/CU}} = 114$; $n_{\text{LS}} = 404$; 95%-CIs are in brackets. Gen = correlation with female (1) and male (0); Edu = correlation with having (1) and not having (0) received tertiary/higher education; EX = extraversion; ES = emotional stability; CO = conscientiousness; AG = agreeableness; CU = culture; LS = life satisfaction.

Enticing by Interesting, Abundant, Meaningful, Beautiful, and Worth exploring; and Alive by Intentional, Needs me, and Interactive.

Future studies will show whether these kernels will also emerge in other adaptations and cross-cultural validation studies, or whether we will find further differences in the higher-order structure that are culture-specific. Notably, both Clifton et al. (2019) and our samples were predominantly drawn from WEIRD-centric populations (see Henrich, Heine, & Norenzayan, 2010), which could explain the substantial factor congruence and especially warrant further studies in non-WEIRD samples. However, cultural differences would not necessarily speak against the validity of Clifton et al. (2019) model, but rather extend its scope to

also include cultural variations that could inform cross-cultural differences in behavior, emotion, and cognition. We hence hope that primals research will be picked up worldwide and contribute to distinguishing such cultural universals and particulars.

However, a comprehensive theory must not ignore the finding that some tertiary primals, namely Acceptable, Hierarchical, and Changing, have now been repeatedly shown to constitute branches that are largely independent of the remaining primals. This finding informs at least three hypotheses: First, it could be assumed that this is indeed the higher-order structure of primal world beliefs and that not all tertiary primals need to load on a primary primal. Primals are by definition "maximally general" (see Clifton et al., 2019) and thus cannot automatically be expected to collapse into higher-order factors. Still, this raises the question whether Acceptable, Hierarchical, and Changing should be assumed to be more akin to secondary primals, because they seem to naturally constitute more abstract concepts than, for example, Pleasurable and Harmless.

Second, it could be assumed that the missing connection is a nomothetic artifact and that *individuals* indeed think of these tertiary primals as either Good or not Good. If so, we would be able to distinguish multiple subpopulations that differ regarding the connection of their implicit beliefs: For example, political leaning could be assumed to distinguish between individuals who believe that a Hierarchical world is Good (conservative/right-wing) or not (progressive/left-wing). This hypothesis would connect the previously independent tertiary primals with the higher-order factors but would also necessitate a more differentiated model.

Third, it could be assumed that the model is incomplete and that we miss further primals. In this study, the three additional secondary primals Empowering, Communal, and Fluid did not collapse into another primary primal, but there is indeed a certain degree of communality between them: They are all concerned with stability and change, stagnation and motion, and convention and progress, or what Clifton et al. (2019) referred to as *Flux*. If they get paired with further cognate primals, they might collapse into a second strong primary primal which would presumably be orthogonal to Good. This hypothesis would necessitate a theoretical revision of the model and the discovery of additional tertiary primals. These three hypotheses emphasize the need for further research into the very foundation of the model. We believe that such research is critical to better understand primals' higher-order structure and that it should be one of the prime concerns of future studies.

4.3. Limitations

Our results suggest that the PI-66-G is capable of reliably measuring the tertiary, secondary, and primary primals. The inventory now comprises 66 items, but it could be further shortened for studies that require more brevity by only administering the two items per scale that yielded the highest CITCs. In turn, the inventory could be extended for case studies and individual comparisons by adapting some of the additional items that were not included in the final PI-99 or to devise new German items. Due to convenience sampling, this study's results have limited generalizability: We suggest reevaluating the PI-66-G in a more representative sample and using the final item set. As self-selection to the study may have resulted in participants having comparatively high educational backgrounds, we recommend replication in more diversified, non-WEIRD samples. Although the sample sizes were sufficient for estimating correlations with key demographics ($N = 592$) and life satisfaction ($n = 404$), the sample sizes of the Big Five ($n = 114$) were relatively small and the effects should be considered tentative.

Next steps could be evaluating the primals' stability, social desirability, convergent and discriminant validity, and nomological network with other individual-differences variables (see Clifton et al., 2019). The PI-66-G's content validity could also be evaluated using German text corpora (e.g., newspaper articles, novels, historic literature) or

Twitter data. This would allow for testing whether the German primals' landscape maps onto the U.S. American, or whether there are important German-specific primals that have so far not been captured by the PI-66-G. Eventually, such and other analogies and differences with the PI-99 and further language versions of the Primals Inventory can be explored in cross-cultural studies.

4.4. Conclusion

Animating primals research is the idea that seeing the world from the perspective of others—and being able measure those differences—is useful. Until now this has been possible only in English. We present the PI-66-G, an internally consistent and initially validated inventory to assess primal world beliefs in German-speaking countries. The PI-66-G allows for measuring Clifton et al.' (2019) 22 tertiary primals, three secondary primals, and one primary primal, and three additional secondary primals (Empowering, Communal, Fluid). Our study can be considered an example of how to investigate primals in other languages and cultures, and we hope that our insights stimulate further research that advances our understanding of whether and how cultural variations can influence primals.

CRedit authorship contribution statement

Alexander G. Stahlmann: Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Writing - original draft, Writing - review & editing, Visualization, Project administration. **Jennifer Hofmann:** Conceptualization, Methodology, Resources, Writing - original draft, Writing - review & editing, Project administration. **Willibald Ruch:** Conceptualization, Methodology, Writing - review & editing, Supervision. **Sonja Heintz:** Conceptualization, Methodology, Writing - review & editing. **Jeremy D.W. Clifton:** Resources, Writing - review & editing, Supervision.

Declaration of competing interest

None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.paid.2020.110054>.

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